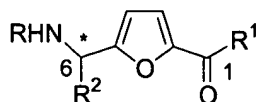


CLAIMS

1. An unnatural chiral furan amino acids carrying natural amino acid side-chains at C6-position and having a general structure 1 as shown in Formula 1



1

Formula 1

* (Stereochemistry of C6 is either *R* or *S*)

Wherein;

R = H, *tert*-butoxycarbonyl (Boc), benzyloxycarbonyl (Cbz), 9-fluorenylmethyl (Fmoc), acetyl or salts such as HCl, CF₃COOH.H and others;

R¹ = -OH, -O-alkyl, -O-arylalkyl, -amine, -alkylamine, -arylalkylamine, and others;

R² = CH₃-, (CH₃)₂CH-, (CH₃)₂CHCH₂-, CH₃CH₂CH(CH₃)-, alkyl groups;

(OR³)CH₂-, CH₃(OR³)CH-, (R³S)CH₂-, CH₃SCH₂CH₂-,

(RHN)CH₂CH₂CH₂CH₂-, (CONH₂)CH₂-, (CONH₂)CH₂CH₂-, (CO₂R⁴)CH₂-,

(CO₂R⁴)CH₂CH₂-, Ph-, Ar-, PhCH₂-, ArCH₂-, Phenylalkyl-, arylalkyl-,

(indolyl)CH₂-, (imidazolyl)CH₂-, and all other amino acid side-chains;

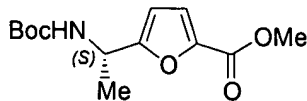
R³ = H, *tert*-butyl, alkyl, benzyl, arylCH₂, CO(alkyl), CO(arylalkyl), SO₃H,

PO₃H₂, silyl and others;

R⁴ = H, *tert*-butyl, alkyl, benzyl, arylCH₂, and others;

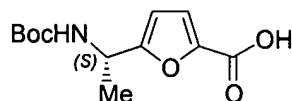
R-R² = -(CH₂)_n- (n = 2, 3, 4...).

2. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are R¹ = Me, R² = Me and R = Boc having a structural formula 2 shown here below



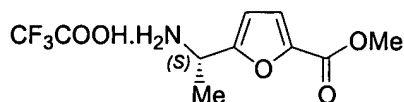
2

3. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are R¹ = OH, R² = Me and R = Boc having a structural formula 3 shown here below



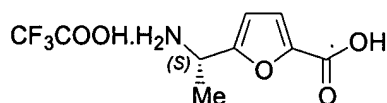
3

4. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{Me}$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula 4 shown here below



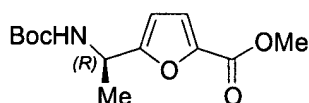
4

5. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{Me}$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula 5 shown here below



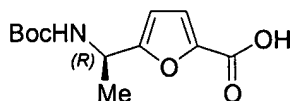
5

6. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{Me}$ and $R = \text{Boc}$ having a structural formula 6 shown here below



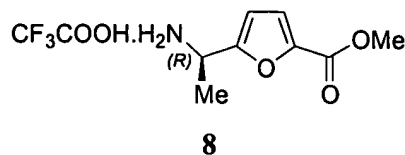
6

7. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{Me}$ and $R = \text{Boc}$ having a structural formula 7 shown here below

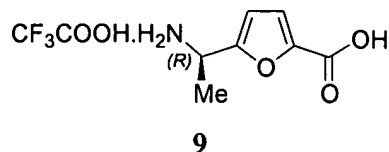


7

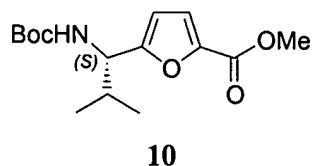
8. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{Me}$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula 8 shown here below



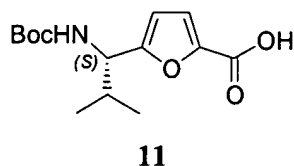
9. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{Me}$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula 9 shown here below



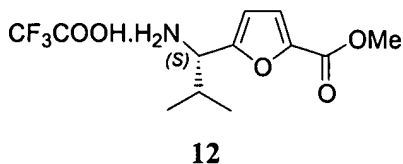
10. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{CHMe}_2$ and $R = \text{Boc}$ having a structural formula 10 shown here below



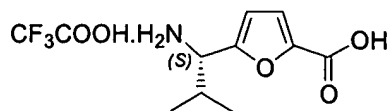
11. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{CHMe}_2$ and $R = \text{Boc}$ having a structural formula 11 shown here below



12. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{CHMe}_2$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula 12 shown here below

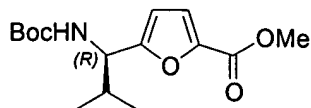


13. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{CHMe}_2$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula 13 shown here below



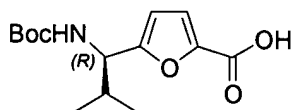
13

14. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{CHMe}_2$ and $R = \text{Boc}$ having a structural formula 14 shown here below



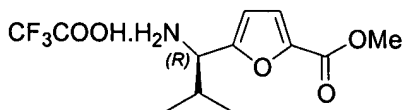
14

15. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{CHMe}_2$ and $R = \text{Boc}$ having a structural formula 15 shown here below



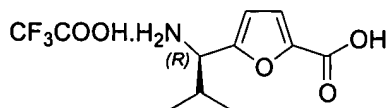
15

16. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{CHMe}_2$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula 16 shown here below



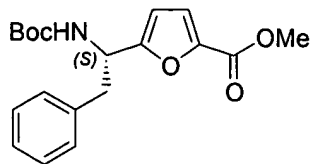
16

17. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{CHMe}_2$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula 17 shown here below



17

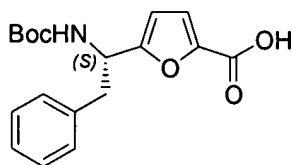
18. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{CH}_2\text{Ph}$ and $R = \text{Boc}$ having a structural formula **18** shown here below



5

18

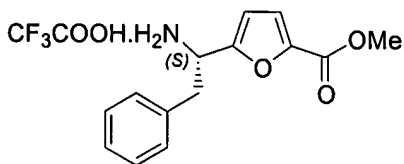
19. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{CH}_2\text{Ph}$ and $R = \text{Boc}$ having a structural formula **19** shown here below



10

19

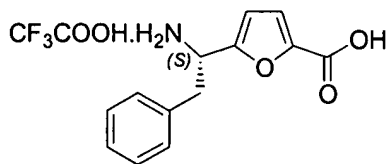
20. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{CH}_2\text{Ph}$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula **20** shown here below



15

20

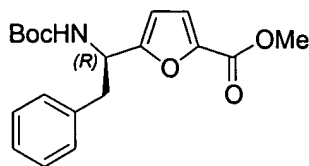
21. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *S* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{CH}_2\text{Ph}$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula **21** shown here below



20

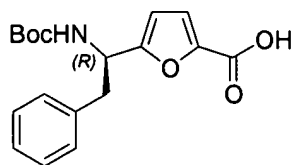
21

22. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{CH}_2\text{Ph}$ and $R = \text{Boc}$ having a structural formula **22** shown here below



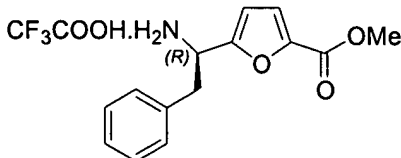
22

23. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{CH}_2\text{Ph}$ and $R = \text{Boc}$ having a structural formula 23 shown here below



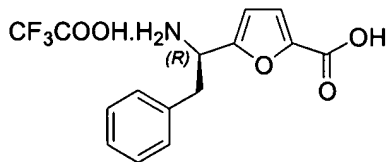
23

24. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OMe}$, $R^2 = \text{CH}_2\text{Ph}$ and $R = \text{CF}_3\text{COOH.H}$ having a structural formula 24 shown here below



24

25. A chiral furan amino acid as claimed in claim 1, wherein if the stereochemistry of C6 is *R* and the substitutions are $R^1 = \text{OH}$, $R^2 = \text{CH}_2\text{Ph}$ and $R = \text{CF}_3\text{COOH.Hc}$ having a structural formula 25 shown here below



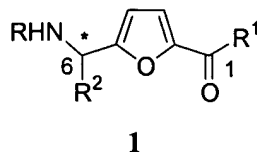
25

26. A process as claimed in claim 1, wherein if structure 1 with substitution $R = \text{Boc}$, $R^1 = \text{OH}$, $R^2 = \text{Me}$ and 6*S* stereochemistry, has the following characteristics: $R_f = 0.45$ (silica, 1:9 MeOH/ CHCl_3 with 1% AcOH); $[\alpha]_D^{23} = -52.8$ (*c* 1.14, MeOH); $^1\text{H NMR}$ (200 MHz, CDCl_3) δ 7.17 (br d, $J = 2.2$ Hz, 1 H, aromatic), 6.29 (d, $J = 2.2$ Hz, 1 H, aromatic), 5.04 (br m, 1 H, NH), 4.93 (br

m, 1 H, *CHNH*), 1.48 (d, $J = 6.59$ Hz, 3 H, CH_3), 1.42 (s, 9 H, *t*-butyl) and yield up to 98%.

27. A process as claimed in claim 1, wherein if structure 1 with substitution R = Boc, $\text{R}^1 = \text{OH}$, $\text{R}^2 = \text{CHMe}_2$ and 6*S* stereochemistry, has the following characteristics: $R_f = 0.5$ (silica, 1:9 MeOH/ CHCl_3 with 1% AcOH); ^1H NMR (200 MHz, CDCl_3) δ 7.18 (br 1 H, one of the furan ring protons), 6.39 (br, 1 H, one of the furan ring protons), 5.09 (br, 1 H, *NH*), 4.61 (br, 1 H, *CHNH*), 2.2 (m, 1 H, $\text{CH}(\text{CH}_3)_2$), 1.42 (s, 9 H, *t*-butyl), 0.95 (d, $J = 6.69$ Hz, 3 H, CH_3), 0.89 (d, $J = 6.69$ Hz, 3 H, CH_3) and yield up to 88%.
28. A process as claimed in claim 1, wherein if structure 1 with substitution R = Boc, $\text{R}^1 = \text{OH}$, $\text{R}^2 = \text{CH}_2\text{Ph}$ and 6*S* stereochemistry, has the following characteristics: $R_f = 0.5$ (silica, 10 MeOH/ CHCl_3 with 1% AcOH); ^1H NMR (200 MHz, CDCl_3) δ 7.18 (m, 5 H, aromatic protons), 7.05 (br, 1 H, one of the furan ring protons), 6.12 (br, 1 H, one of the furan ring protons), 5.03 (m, 2 H, *NH* & *CHNH*), 3.16 (m, 2 H, CH_2Ph), 1.39 (s, 9 H, *t*-butyl) and yield up to 92%.
29. A process as claimed in claim 1, wherein if structure 1 with substitution R = Boc, $\text{R}^1 = \text{OH}$, $\text{R}^2 = \text{Ph}$ and 6*S* stereochemistry, has the following characteristics: $R_f = 0.5$ (silica, 10% MeOH/ CHCl_3 with 1% AcOH); ^1H NMR (200 MHz, CDCl_3) δ 7.29 (m, 5 H, aromatic protons), 7.15 (br, 1 H, one of the furan ring protons), 6.21 (br, 1 H, one of the furan ring protons), 5.85 (br, 1 H, *CHNH*), 5.43 (br, 1 H, *NH*), 1.44 (s, 9 H, *t*-butyl) and yield up to 90%.
30. A chiral furan amino acids as claimed in claims 5, 9, 13, 17, 21 or 25, wherein *N*-Fmoc-protected furan amino acid is obtained by treatment with FmocOSu in dioxane-water in the ration of 1:1.

31. A process for preparing unnatural chiral furan amino acids carrying natural amino acid side-chains in C6-position and having a general structure as shown in structure 1



* (Stereochemistry of C6 is either *R* or *S*)

Wherein; R = H, Boc, Cbz, Fmoc, acetyl or salts such as HCl.H, CF₃COOH.H and others;

R¹ = -OH, -O-alkyl, -O-arylalkyl, -amine, -alkylamine, -arylalkylamine, and others;

R² = CH₃-, (CH₃)₂CH-, (CH₃)₂CHCH₂-, CH₃CH₂CH(CH₃)-, alkyl groups; (OR³)CH₂-, CH₃(OR³)CH-, (R³S)CH₂-, CH₃SCH₂CH₂-, (RHN)CH₂CH₂CH₂CH₂-, (CONH₂)CH₂-, (CONH₂)CH₂CH₂-, (CO₂R⁴)CH₂-, (CO₂R⁴)CH₂CH₂-, Ph-, Ar-, PhCH₂-, ArCH₂-, Phenylalkyl-, arylalkyl-, (indolyl)CH₂-, (imidazolyl)CH₂-, and all other amino acid side-chains;

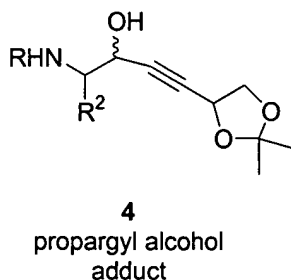
R³ = H, *tert*-butyl, alkyl, benzyl, arylCH₂, CO(alkyl), CO(arylalkyl), SO₃H, PO₃H₂, silyl and others;

R⁴ = H, *tert*-butyl, alkyl, benzyl, arylCH₂, and others;

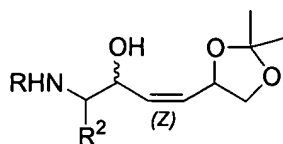
R-R² = - (CH₂)_n- (n = 2, 3, 4...);

said process comprising the steps of:

- a) addition of Li-acetylide, prepared *in-situ* by reacting 3,4-*O*-isopropylidene-1,1-dibromobut-1-en-3,4-diol **3** with *n*-BuLi, to the chiral *N*-protected amino aldehyde **2** to obtain the propargyl alcohol adduct **4** as a mixture of isomers having the structure

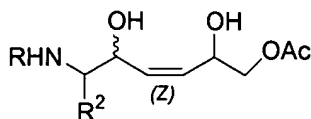


- b) selective hydrogenation of the acetylenic moiety to a *cis* double bond using P2-Ni to get the *cis*-allylic alcohol intermediate **5** having the structure



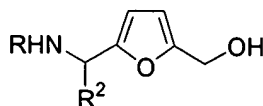
5
cis-allylic alcohol
intermediate

- c) treating **5** with acid to deprotect the acetonide and to furnish an intermediate triol
- d) selective acylation of the primary hydroxyl group of the triol from of step (c) to obtain the "*cis*-2-butene-1,4-diol" intermediate **6** having the structure



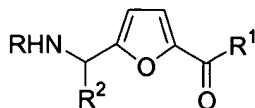
6
"*cis*-2-butene-1,4-diol"
intermediate

- e) oxidation of the "*cis*-2-butene-1,4-diol" intermediate **6** using pyridinium chlorochromate (PCC) to construct the furan ring
- f) deprotection of the intermediate acetate from step (e) in presence of anhydrous K_2CO_3 to obtain the chiral furanyl alcohol intermediate **7** having the structure



7
chiral furanyl alcohol
intermediate

- g) oxidation of the primary hydroxyl of the chiral furanyl alcohol intermediate **7** using Swern oxidation process or SO_3 -py complex to obtain an aldehyde
- h) oxidation of the aldehyde intermediate from step (g) using $NaClO_2 \cdot H_2O_2$ to obtain the desired acid **1** ($R^1 = OH$) having the structure



1

Chiral furan amino acid

- i) transformation of the acid from step (h) into (a) an ester (i) on treatment with CH_2N_2 in ether (1: $\text{R}^1 = \text{OMe}$), or (ii) an alcohol in the presence of acid (1: $\text{R}^1 = \text{O-alkyl}$ etc.); (b) an amide on treatment with an amine in presence of DCC and HOBT (1: $\text{R}^1 = \text{-amine, -alkylamine, -arylalkylamine}$).
32. A process as claimed in claim 31 wherein in step (a), if the structure 4 with substitution $\text{R} = \text{Boc}$, $\text{R}^2 = \text{Me}$ and $6S$ stereochemistry, has the following characteristics: $R_f = 0.5$ (silica, 2:3 ethyl acetate/hexane); ^1H NMR (300 MHz, CDCl_3) δ 4.73-4.68 (ddd, $J = 6.04, 3.78, 1.51$ Hz, 1 H, CHOH), 4.65- 4.62 (d, $J = 8.31$ Hz, 1 H, NH), 4.36-4.32 (ddd, $J = 6.79, 5.29, 1.51$ Hz, 1 H, CHCH_2), 4.15-4.09 (dd, $J = 6.79, 6.04$ Hz, 1 H, one of the CH_2 protons), 3.91-3.86 (dd, $J = 6.04, 5.29$ Hz, 1 H, one of the CH_2 protons), 3.83- 3.76 (m, 1 H, CHNH), 2.89 (bs, 1 H, OH), 1.45 (s, 3 H, acetonide methyl protons), 1.442 (s, 9 H, t -butyl protons), 1.354 (s, 3 H, acetonide methyl protons), 1.247-1.225 (d, $J = 6.79$ Hz, 3 H, CH_3) and yield up to 60 %.
33. A process as claimed in claim 31 wherein in step (a), if the structure 4 with substitution $\text{R} = \text{Boc}$, $\text{R}^2 = \text{CHMe}_2$ and $6S$ stereochemistry, has the following characteristics: $R_f = 0.5$ (silica, 40% EtOAc / Hexane); ^1H NMR (300 MHz, CDCl_3) δ 4.7 (m, 1 H, CHOH), 4.59 (d, $J = 9.07$ Hz, 1 H, NH), 4.12 (m, 1 H, CHCH_2), 3.88 (m, 2 H, CH_2), 3.54 (m, 1 H, CHNH), 1.78 (m, 1 H, $\text{CH}(\text{CH}_3)_2$), 1.46 (s, 9 H, t -butyl), 1.45 (s, 6 H, acetonide protons), 0.99 (d, $J = 6.8$ Hz, 6 H, CH_3) and yield up to 63%.
34. A process as claimed in claim 31 wherein in step (a), if the structure 4 with substitution $\text{R} = \text{Boc}$, $\text{R}^2 = \text{CH}_2\text{Ph}$ and $6S$ stereochemistry, has the following characteristics: $R_f = 0.45$ (silica, 40% EtOAc/Hexane); ^1H NMR (200 MHz, CDCl_3) δ 7.23 (m, 5 H, aromatic protons), 4.82-4.65 (m, 2 H, CHOH & NH),

4.37 (br, 1 H, CHNH), 4.19-4.06 (m, 2 H, CH & one of the CH₂), 3.9 (m, 1 H, one of the CH₂), 2.91 (m, 2 H, CH₂Ph), 1.39-1.38 (m, 15 H, *t*-butyl & acetonide methyls) and yield up to 65%.

5

35. A process as claimed in claim 31 wherein in step (a), if the structure 4 with substitution R = Boc, R² = Ph and 6*S* stereochemistry, has the following characteristics: *R_f* = 0.45 (silica, 40% EtOAc/Hexane); ¹H NMR (200 MHz, CDCl₃) δ 7.29 (m, 5 H, aromatic protons), 5.27-5.18 (m, 2 H, CHOH & NH), 5 (m, 1 H, CHNH), 4.94 (m, 1 H, CH), 4.03 (m, 2 H, CH₂), 1.44 (s, 9 H, *t*-butyl), 1.41 (s, 6 H, acetonide methyls) and yield up to 62%.

10

36. A process as claimed in claim 31 wherein in step (b), if the structure 5 with substitution R = Boc, R² = Me and 6*S* stereochemistry, has the following characteristics: *R_f* = 0.45 (silica, 2:3 ethyl acetate/hexane); ¹H NMR (200 MHz, CDCl₃) δ 5.62-5.55 (m, 2 H, olefinic protons), 4.92-4.68 (m, 2 H, CHOH), 4.36-4.27 (bs, 1 H, NH), 4.15-4.05 (m, 2 H, CH₂OH), 3.71-3.61 (m, 1 H, CH), 3.06 (bs, 1 H, OH), 1.44 (s, 9 H, *t*-butyl protons), 1.40 (s, 3 H, acetonide methyl protons), 1.36 (s, 3 H, acetonide methyl protons), 1.18- 1.15 (d, *J* = 6.69 Hz, 3 H, methyl protons) and yield up to 70%.

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37. A process as claimed in claim 31 wherein in step (b), if the structure 5 with substitution R = Boc, R² = CHMe₂ and 6*S* stereochemistry, has the following characteristics: *R_f* = 0.45 (silica, 30% EtOAc /Hexane); ¹H NMR (300 MHz, CDCl₃) δ 5.65 (m, 1 H, olefinic proton), 5.54 (m, 1 H, olefinic proton), 4.71 (bs, 1 H, NH), 4.5 (m, 1 H, CHOH), 4.09 (m, 1 H, CH), 3.55 (m, 2 H, CH₂), 3.24 (m, 1 H, CHNH), 1.94 (m, 1 H, CH(CH₃)₂), 1.44 (s, 9 H, *t*-butyl), 1.43 (s, 6 H, acetonide methyls), 1.0 (d, *J* = 6.8 Hz, 3 H, CH₃), 0.93 (d, *J* = 6.8 Hz, 3 H, CH₃) and yield up to 60%.

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38. A process as claimed in claim 31 wherein in step (b) if the structure 5 with substitution R = Boc, R² = CH₂Ph and 6*S* stereochemistry, has the following

characteristics: $R_f = 0.45$ (silica, 40% EtOAc/Hexane); ^1H NMR (200 MHz, CDCl_3) δ 7.21 (m, 5 H, aromatic protons), 5.82-5.55 (m, 2 H, olefinic protons), 4.78 (m, 1 H, NH), 4.62-4.34 (m, 2 H, CHOH & CH), 4.06 (m, 1 H, CHNH), 3.51 (m, 2 H, CH_2), 2.85 (m, 2 H, CH_2Ph), 1.39-1.32 (m, 15 H, *t*-butyl & acetonide methyls) and yield up to 65%.

39. A process as claimed in claim 31 wherein in step (b), if the structure 5 with substitution $R = \text{Boc}$, $R^2 = \text{Ph}$ and 6*S* stereochemistry, has the following characteristics: $R_f = 0.45$ (silica, 40% EtOAc/hexane); ^1H NMR (200 MHz, CDCl_3) δ 7.25 (m, 5 H, aromatic protons), 5.87-5.55 (m, 2 H, olefinic protons), 5.25 (m, 2 H, CHOH, NH), 4.99 (m, 1 H, CHNH), 4.58 (m, 1 H, CH), 3.90 (m, 2 H, CH_2), 1.44 (s, 9 H, *t*-butyl), 1.41 (s, 6 H, acetonide methyls) and yield up to 70%.

40. A process as claimed in claim 31 wherein in step (d), if the structure 6 with substitution $R = \text{Boc}$, $R^2 = \text{Me}$ and 6*S* stereochemistry, has the following characteristics: $R_f = 0.6$ (silica, 1:9 methanol/chloroform); ^1H NMR (200 MHz, CDCl_3) δ 5.66-5.46 (two dd, $J = 11.89, 6.69$ Hz, 2 H, olefinic protons), 4.90-4.85 (d, $J = 8.92$ Hz, 1 H, NH), 4.66-4.59 (dt, $J = 6.69, 4.46$ Hz, 1 H, CHOH), 4.41-4.36 (ddd, $J = 6.69, 5.02, 4.46$ Hz, 1 H, CHOH), 4.16-3.98 (two dd, $J = 11.15, 6.69$ and $11.15, 4.46$ Hz, 2 H, CH_2OAc), 2.09 (s, 3 H, CH_3CO), 1.44 (s, 9 H, *t*-butyl), 1.20- 1.17 (d, $J = 6.69$ Hz, 3 H, CH_3) and yield up to 93%.

41. A process as claimed in claim 31 wherein in step (d), if the structure 6 with substitution $R = \text{Boc}$, $R^2 = \text{CHMe}_2$ and 6*S* stereochemistry, has the following characteristics: $R_f = 0.45$ (silica, 10% MeOH/ CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ 5.66 (dd, $J = 11.33, 7.93$ Hz, 1 H, olefinic proton), 5.54 (dd, $J = 11.33, 8.31$ Hz, 1 H, olefinic proton), 4.72-4.67 (m, 1 H, CHOH), 4.4 (dd, $J = 7.93, 6.8$ Hz, 1 H, CH), 4.18 (dd, $J = 11.33, 3.4$ Hz, 1 H one of the CH_2), 3.93 (dd, $J = 11.33, 7.55$ Hz, 1 H, one of the CH_2), 2.1 (s, 3 H, COCH_3), 2 (m, 1 H, $\text{CH}(\text{CH}_3)_2$), 1.42 (s, 9 H, *t*-butyl), 0.97 (d, $J = 6.8$ Hz, 3 H, CH_3), 0.92 (d, $J = 6.8$ Hz, 3 H, CH_3) and yield up to 80%.

42. A process as claimed in claim 31 wherein in step (d), if the structure 6 with substitution $R = \text{Boc}$, $R^2 = \text{CH}_2\text{Ph}$ and $6S$ stereochemistry, has the following characteristics: $R_f = 0.45$ (silica, 10% MeOH/ CHCl_3); ^1H NMR (200 MHz, CDCl_3) δ 7.21 (m, 5 H, aromatic protons), 5.68-5.45 (m, 2 H, olefinic protons), 4.65 (m, 2 H, CHOH & NH), 4.45 (m, 1 H, CHOH), 4.05 (m, 2 H, CH_2), 3.8 (m, 1 H, CHNH), 2.85 (m, 2 H, CH_2Ph), 2.04 (s, 3 H, COCH_3), 1.25 (m, 15 H, *t*-butyl) and yield up to 90%.
43. A process as claimed in claim 31 wherein in step (d), if the structure 6 with substitution $R = \text{Boc}$, $R^2 = \text{Ph}$ and $6S$ stereochemistry, has the following characteristics: $R_f = 0.45$ (silica, 10% MeOH/ CHCl_3); ^1H NMR (200 MHz, CDCl_3) δ 7.29 (m, 5 H, aromatic protons), 5.87-5.55 (m, 2 H, olefinic protons), 5.25 (m, 2 H, CHOH & NH), 4.85 (m, 1 H, CHNH), 4.61 (m, 1 H, CHOH), 4.21 (m, 2 H, CH_2), 2.1 (s, 3 H, COCH_3), 1.44 (s, 9 H, *t*-butyl) and yield up to 85%.
44. A process as claimed in claim 31 wherein in step (f), if the structure 7 with substitution $R = \text{Boc}$, $R^2 = \text{Me}$ and $6S$ stereochemistry, has the following characteristics: $R_f = 0.45$ (silica, 1:1 ethyl acetate/hexane); $[\alpha]_{\text{D}}^{23} = -59.9$ (*c* 1.76, CHCl_3); ^1H NMR (200 MHz, CDCl_3) δ 6.17-6.14 (d, $J = 2.97$ Hz, 1 H, one of the ring protons), 6.08-6.04 (d, $J = 2.97$ Hz, 1 H, one of the ring protons), 4.86-4.71 (bs, 2 H, NH and CH), 4.52 (s, 2 H, CH_2OH), 2.14- 1.93 (bs, 1 H, OH) 1.48- 1.43 (s, 12 H, *t*-butyl group and methyl protons) and yield up to 98%.
45. A process as claimed in claim 31 wherein in step (f), if the structure 7 with substitution $R = \text{Boc}$, $R^2 = \text{CHMe}_2$ and $6S$ stereochemistry, has the following characteristics: $R_f = 0.5$ (silica, 30% EtOAc/Hexane); $[\alpha]_{\text{D}}^{23} = -59.9$ (*c* 1.76, CHCl_3); ^1H NMR (300 MHz, CDCl_3) δ 6.16 (d, $J = 2.93$ Hz, 1 H, one of the furan ring protons), 6.06 (d, $J = 2.93$ Hz, 1 H, one of the furan ring protons), 4.84 (d, $J = 8.79$ Hz, 1 H, NH), 4.53 (s, 2 H, CH_2OH), 4.52 (m, 1 H, CHNH) 2.09 (m, 1 H, $\text{CH}(\text{CH}_3)_2$), 1.44 (s, 9 H, *t*-butyl), 0.94 (d, $J = 6.59$ Hz, 3 H, CH_3), 0.88 (d, $J = 6.59$ Hz, 3 H, CH_3) and yield up to 95%.

46. A process as claimed in claim 31 wherein in step (f), if the structure 7 with substitution $R = \text{Boc}$, $R^2 = \text{CH}_2\text{Ph}$ and 6*S* stereochemistry, has the following characteristics: $R_f = 0.5$ (silica, 40% EtOAc/hexane); ^1H NMR (200 MHz, CDCl_3) δ 7.2 (m, 3 H, aromatic protons), 7.02 (m, 2 H, aromatic protons), 6.12 (d, $J = 2.97$ Hz, 1 H, one of the furan ring protons), 5.93 (d, $J = 2.97$ Hz, 1 H, one of the furan ring protons), 4.94 (m, 1 H, *CHNH*), 4.81 (d, $J = 8.92$ Hz, 1 H, *NH*), 4.53 (s, 2 H, CH_2OH), 3.09 (d, $J = 6.69$ Hz, 2 H, CH_2Ph), 1.39 (s, 9 H, *t*-butyl) and yield up to 96%.
- 10 47. A process as claimed in claim 31 wherein in step (f), if the structure 7 with substitution $R = \text{Boc}$, $R^2 = \text{Ph}$ and 6*S* stereochemistry, has the following characteristics: $R_f = 0.45$ (silica, 40% EtOAc/Hexane); ^1H NMR (400 MHz, CDCl_3) δ 7.29 (m, 5 H, aromatic protons), 6.16 (d, $J = 3.05$ Hz, 1 H, one of the furan ring protons), 6.02 (d, $J = 3.05$ Hz, 1 H, one of the furan ring protons), 5.87 (br, 1 H, *NH*), 5.25 (d, $J = 8.52$ Hz, 1 H, *CHNH*), 4.51 (s, 2 H, CH_2OH), 1.44 (s, 9 H, *t*-butyl) and yield up to 95%.
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